

CONTROL ID: 2817721

TITLE: Large-Scale Traveling Weather Systems in Mars' Southern Extratropics

ABSTRACT BODY:

Abstract (2,250 Maximum Characters): Between late fall and early spring, Mars' middle- and high-latitude atmosphere supports strong mean equator-to-pole temperature contrasts and an accompanying mean westerly polar vortex. Observations from both the MGS Thermal Emission Spectrometer (TES) and the MRO Mars Climate Sounder (MCS) indicate that a mean baroclinicity-barotropy supports intense, large-scale eastward traveling weather systems (i.e., transient synoptic-period waves). Such extratropical weather disturbances are critical components of the global circulation as they serve as agents in the transport of heat and momentum, and generalized scalar/tracer quantities (e.g., atmospheric dust, water-vapor and ice clouds). The character of such traveling extratropical synoptic disturbances in Mars' southern hemisphere during late winter through early spring is investigated using a moderately high-resolution Mars global climate model (Mars GCM). This Mars GCM imposes interactively-lifted and radiatively-active dust based on a threshold value of the surface stress. The model exhibits a reasonable "dust cycle" (i.e., globally averaged, a dustier atmosphere during southern spring and summer occurs). Compared to the northern-hemisphere counterparts, the southern synoptic-period weather disturbances and accompanying frontal waves have smaller meridional and zonal scales, and are far less intense. Influences of the zonally asymmetric (i.e., east-west varying) topography on southern large-scale weather are investigated, in addition to large-scale up-slope/down-slope flows and the diurnal cycle. A southern storm zone in late winter and early spring presents in the western hemisphere via orographic influences from the Tharsis highlands, and the Argyre and Hellas impact basins. Geographically localized transient-wave activity diagnostics are constructed that illuminate dynamical differences amongst the simulations and these are presented.

CURRENT CATEGORY: Mars: Atmosphere

CURRENT : None

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